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Kazunari Kimino

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EXAMINER

KOCH, GEORGE R

ART UNIT

PAPER NUMBER

1791

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DELIVERY MODE

04/17/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/609,634

Applicant(s)

KIMINO, KAZUNARI

Examiner

George R. Koch III

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period **will** apply and **will** expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply **will**, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 April 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 5,9,27,31,36 and 39-44 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 5,9,27,31,36 and 39-44 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114 was filed in this application after appeal to the Board of Patent Appeals and Interferences, but prior to a decision on the appeal. Since this application is eligible for continued examination under 37 CFR 1.114 and the fee set forth in 37 CFR 1.17(e) has been timely paid, the appeal has been withdrawn pursuant to 37 CFR 1.114 and prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 4/4/2008 has been entered.

Claim Rejections - 35 USC § 102

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 41-44 are rejected under 35 U.S.C. 102(b) as being anticipated by Ciardella (US 5,711,989).

As to claim 41, Ciardella discloses an apparatus (see Figure 5) for manufacturing a semiconductor device, comprising: a substrate holding unit (conveyor and fixer - see lift and lock mechanism in column 3, lines 5-13 and column 5, lines 36-40) for holding a semiconductor wafer substrate (i.e., a circuit board with semiconductor elements thereon, see columns 1-10), wherein said semiconductor wafer substrate is capable of being provided with at least one electrode formed on a first surface thereof (chip 10, solder balls 12, etc), a discharging mechanism (syringe 20 and dispensing needle 22) which is explicitly for discharging droplets

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(see abstract, which recites “drop generator”) of viscous material (for example, column 8, lines 8-10) contained in a viscous material container unit (syringe 84) through at least one discharging nozzle (nozzle 70) onto said first surface of said semiconductor wafer substrate held on said substrate holding unit; a drive mechanism (conveyor 22 and XYZ electromechanical positioner 38) for displacing at least one of said semiconductor wafer substrate and said discharging nozzle; and a control unit (items 18, 38, 40, and 42) for controlling said discharging mechanism and said drive mechanism such that said raw sealant resin is attached to said first surface of said semiconductor wafer substrate except at least a portion of said electrode. The camera and vision circuit is an image information device (item 16 and 44) that provides image information of the substrate (such as the location of the drops), and effectively allows for the positioning of the drive mechanism of the nozzle, and therefore provides and is capable of providing the control unit functionality as claim. The camera is capable of capturing the image prior to discharge. The apparatus of Ciardella, disclosed as dispensing viscous material, is capable of dispensing any sub-species of viscous material including raw sealant resin. The apparatus of Ciardella is capable of performing the intended use of dispensing such that a resin layer having an uneven surface structure is formed from the raw sealant resin.

As to claims 42, 43, and 44, Ciardella is capable of being used to perform the operation of dispensing to form a concave structure, an uneven surface structure of predetermined shape, or an uneven surface structure which comprises a thickness of approximately 15 micrometers, having concave portions of approximately 20 micrometers deep.

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4. Claims 36, 40, and 41-44 are rejected under 35 U.S.C. 102(b) as being anticipated by Bouras (US 5,906,682), as evidenced by Ciardella '777 (US 5,505,777). It should be noted that the Bouras reference incorporates by reference the US 5,505,777 to Ciardella reference in column 3, lines 62-65 of Bouras.

As to claim 36, Bouras, which discloses an improvement of Ciardella '777, further discloses that a similar semiconductor wafer substrate (either of chip 10 or circuit board 16), the semiconductor wafer substrate having at least one electrode (items 12 and 14) on a first surface thereof. Ciardella '777 discloses the discharging head (nozzle 70 and subelements - see Figure 3), the resin container unit (syringe 84), the drive mechanism (conveyor 22 and XYZ electromechanical positioner 38), and control unit (items 18, 38, 40, and 42) for controlling the discharging head and the drive mechanism (see rejection of claim 1 and 23 above) and wherein the substrate is held in a substrate holding unit (conveyor and fixer - see lift and lock mechanism in column 3, lines 5-13 and column 5, lines 36-40). The camera and vision circuit is an image information device (item 16 and 44) that provides image information of the substrate (such as the location of the drops), and effectively allows for the positioning of the drive mechanism of the nozzle, and therefore provides and is capable of providing the control unit functionality as claim. Bouras discloses that at least one electrode has a protruded shape (as seen in Figures 1 and 2). Additionally, Bouras and Ciardella '777 is capable of being used to control said discharging head and said drive mechanism such that the first surface of the semiconductor wafer is covered by said raw sealant resin except a tip portion of said protruded-shaped electrode.

As to claim 40, Bouras, which discloses an improvement of Ciardella '777, further discloses that a similar semiconductor wafer substrate (either of chip 10 or circuit board 16), the

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semiconductor wafer substrate having at least one electrode (items 12 and 14) on a first surface thereof. Ciardella '777 discloses the discharging head (nozzle 70 and subelements - see Figure 3), the resin container unit (syringe 84), the drive mechanism (conveyor 22 and XYZ electromechanical positioner 38), and control unit (items 18, 38, 40, and 42) for controlling the discharging head and the drive mechanism (see rejection of claim 1 and 23 above) and wherein the substrate is held in a substrate holding unit (conveyor and fixer - see lift and lock mechanism in column 3, lines 5-13 and column 5, lines 36-40). The camera and vision circuit is an image information device (item 16 and 44) that provides image information of the substrate (such as the location of the drops), and effectively allows for the positioning of the drive mechanism of the nozzle, and therefore provides and is capable of providing the control unit functionality as claim. Bouras (item 26) and Ciardella '777 disclose a heater (see column 6, lines 64-67 and column 7, lines 1-19) for heating said raw sealant resin contained in said resin container unit.

As to claim 41, Bouras and Ciardella '777 discloses an apparatus (see Figure 5 of Bouras, Figure 2 of Ciardella '777) for manufacturing a semiconductor device, comprising: a substrate holding unit (conveyor and fixer - see lift and lock mechanism in Ciardella '777, column 3, lines 5-13 and column 5, lines 36-40) for holding a semiconductor wafer substrate (i.e., a circuit board with semiconductor elements thereon, see columns 1-10), wherein said semiconductor wafer substrate is capable of being provided with at least one electrode formed on a first surface thereof (chip 10, solder balls 12, etc), a discharging mechanism (syringe 20 and dispensing needle 22, see also Figure 3 of Ciardella '777) which is explicitly for discharging droplets (see abstract, which recites "drop generator") of viscous material (for example, column 8, lines 8-10)

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contained in a viscous material container unit (syringe 20 of Bouras, syringe 84 of Ciardella '777) through at least one discharging nozzle (nozzle 70) onto said first surface of said semiconductor wafer substrate held on said substrate holding unit; a drive mechanism (conveyor 22 and XYZ electromechanical positioner 38) for displacing at least one of said semiconductor wafer substrate and said discharging nozzle; and a control unit (items 18, 38, 40, and 42) for controlling said discharging mechanism and said drive mechanism such that said raw sealant resin is attached to said first surface of said semiconductor wafer substrate except at least a portion of said electrode. The camera and vision circuit is an image information device (item 16 and 44) that provides image information of the substrate (such as the location of the drops), and effectively allows for the positioning of the drive mechanism of the nozzle, and therefore provides and is capable of providing the control unit functionality as claim. The apparatus of Bouras, disclosed as dispensing viscous material, is capable of dispensing any sub-species of viscous material including raw sealant resin. Bouras explicitly discloses capturing image information of the substrate prior to discharge (see column 6, lines 18-36). The apparatus of Bouras is capable of performing the intended use of dispensing such that a resin layer having an uneven surface structure is formed from the raw sealant resin.

As to claims 42, 43, and 44, Bouras is capable of being used to perform the operation of dispensing to form a concave structure, an uneven surface structure of predetermined shape, or an uneven surface structure which comprises a thickness of approximately 15 micrometers, having concave portions of approximately 20 micrometers deep.

Claim Rejections - 35 USC § 103

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claims 5, 9, 27 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ciardella (US 5,711,989), and Nakazawa (US 5,935,375).

As to claim 5 and 27, Ciardella discloses an apparatus (see Figure 5) for manufacturing a semiconductor device, comprising: a substrate holding unit/means (conveyor and fixer - see lift and lock mechanism in column 3, lines 5-13 and column 5, lines 36-40) for holding a semiconductor wafer substrate (i.e., a circuit board with semiconductor elements thereon, see columns 1-10), wherein said semiconductor wafer substrate is capable of being provided with at least one electrode formed on a first surface thereof (chip 10, solder balls 12, etc), a discharging mechanism (syringe 20 and dispensing needle 22) which is explicitly means for discharging droplets (see abstract, which recites "drop generator") of viscous material (for example, column 8, lines 8-10) contained in a viscous material container unit (syringe 84) through at least one discharging nozzle (nozzle 70) onto said first surface of said semiconductor wafer substrate held on said substrate holding unit; a drive mechanism or means (conveyor 22 and XYZ electromechanical positioner 38) for displacing at least one of said semiconductor wafer substrate and said discharging nozzle; and a control unit or means (items 18, 38, 40, and 42) for controlling said discharging mechanism and said drive mechanism such that said raw sealant resin is attached to said first surface of said semiconductor wafer substrate except at least a

portion of said electrode. The camera and vision circuit is an image information device or means for (item 16 and 44) that captures and provides image information of the substrate (such as the location of the drops), and effectively allows for the positioning of the drive mechanism of the nozzle, and therefore provides and is capable of providing the control unit functionality as claim, such as the position. The camera is capable of capturing the image prior to discharge. The apparatus of Ciardella, disclosed as dispensing viscous material, is capable of dispensing any sub-species of viscous material including raw sealant resin.

Ciardella does not disclose that said discharging mechanism is provided with a plurality of discharging nozzles.

Nakazawa discloses using a discharging mechanism is provided with a plurality of discharging nozzles (see Figures 7A, 7B, 8A, and 8B). Nakazawa discloses that different nozzle sizes can be used in order minimize the differences in the rate of resin dispensing, so that the formation of resin-less voids is deterred (column 4, lines 26-45). The discharging nozzle of Nakazawa meet the limitation of being two different kinds of discharging mechanisms, heads or means. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized multiple nozzles as in Nakazawa in order to avoid resin-less voids.

As to claim 9, the control unit of Ciardella capable of said control unit controls said discharging mechanism and said drive mechanism such that a first discharging mechanism of said at least two kinds of discharging mechanisms is capable of discharging droplets of raw sealant resin of an amount smaller than other discharging mechanisms used for discharging said raw sealant resin for an area in a vicinity of said electrode.

Similarly, claim 31 is rejected under the same grounds as claim 9 above.

7. Claim 36 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ciardella (US 5,711,989) and further in view of Bouras (US 5,906,682).

As for claim 36, Ciardella discloses the discharging head (nozzle 70 and subelements - see Figure 3), the resin container unit (syringe 84), the drive mechanism (conveyor 22 and XYZ electromechanical positioner 38), and control unit (items 18, 38, 40, and 42) for controlling the discharging head and the drive mechanism (see rejection of claim 1 and 23 above) and wherein the substrate is held in a substrate holding unit (conveyor and fixer - see lift and lock mechanism in column 3, lines 5-13 and column 5, lines 36-40). The camera and vision circuit is an image information device (item 16 and 44) that provides image information of the substrate (such as the location of the drops), and effectively allows for the positioning of the drive mechanism of the nozzle, and therefore provides and is capable of providing the control unit functionality as claim. Ciardella is capable of being used to control said discharging head and said drive mechanism such that the first surface of the semiconductor wafer is covered by said raw sealant resin except a tip portion of said protruded-shaped electrode.

However, while Ciardella does disclose a semiconductor substrate (circuit board 35), Ciardella is silent as to the details of the circuit board. Ciardella is also silent as to the electrode shape, although the electrode is part of the substrate and provides no patentable weight.

Bouras, which discloses an improvement of Ciardella, further discloses that a similar semiconductor wafer substrate (either of chip 10 or circuit board 16), the semiconductor wafer substrate having at least one electrode (items 12 and 14) on a first surface thereof. Bouras as incorporated discloses that at least one electrode has a protruded shape (as seen in Figures 1 and

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2). Therefore, one in the art would appreciate that the claimed substrate can be used with Ciardella. One in the art would utilize the claimed substrate in order to properly coat the substrate and to reduce the need for multiple versions of similar apparatus. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized such a substrate with the apparatus of Ciardella in order to reduce apparatus costs.

As for claim 40, Ciardella discloses the discharging head (nozzle 70 and subelements - see Figure 3), the resin container unit (syringe 84), the drive mechanism (conveyor 22 and XYZ electromechanical positioner 38), and control unit (items 18, 38, 40, and 42) for controlling the discharging head and the drive mechanism (see rejection of claim 1 and 23 above) and wherein the substrate is held in a substrate holding unit (conveyor and fixer - see lift and lock mechanism in column 3, lines 5-13 and column 5, lines 36-40). The camera and vision circuit is an image information device (item 16 and 44) that provides image information of the substrate (such as the location of the drops), and effectively allows for the positioning of the drive mechanism of the nozzle, and therefore provides and is capable of providing the control unit functionality as claim. Ciardella also discloses a heater (see column 6, lines 64-67 and column 7, lines 1-19) for heating said raw sealant resin contained in said resin container unit.

However, while Ciardella does disclose a semiconductor substrate (circuit board 35), Ciardella is silent as to the details of the circuit board.

Bouras, which discloses an improvement of Ciardella, further discloses that a similar semiconductor wafer substrate (either of chip 10 or circuit board 16), the semiconductor wafer substrate having at least one electrode (items 12 and 14) on a first surface thereof. Therefore,

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one in the art would appreciate that the claimed substrate can be used with Ciardella. One in the art would utilize the claimed substrate in order to properly coat the substrate and to reduce the need for multiple versions of similar apparatus. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized such a substrate with the apparatus of Ciardella in order to reduce apparatus costs.

8. Claims 5, 9, 27 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bouras and Ciardella '777 and further in view of Nakazawa (US 5,935,375).

It should be noted that the Bouras reference incorporates by reference the US 5,505,777 to Ciardella reference in column 3, lines 62-65 of Bouras.

As to claim 5 and 27, Bouras and Ciardella '777 discloses an apparatus (see Figure 5 of Bouras, Figure 2 of Ciardella '777) for manufacturing a semiconductor device, comprising: a substrate holding unit (conveyor and fixer - see lift and lock mechanism in Ciardella '777, column 3, lines 5-13 and column 5, lines 36-40) for holding a semiconductor wafer substrate (i.e., a circuit board with semiconductor elements thereon, see columns 1-10), wherein said semiconductor wafer substrate is capable of being provided with at least one electrode formed on a first surface thereof (chip 10, solder balls 12, etc), a discharging mechanism (syringe 20 and dispensing needle 22, see also Figure 3 of Ciardella '777) which is explicitly for discharging droplets (see abstract, which recites "drop generator") of viscous material (for example, column 8, lines 8-10) contained in a viscous material container unit (syringe 20 of Bouras, syringe 84 of Ciardella '777) through at least one discharging nozzle (nozzle 70) onto said first surface of said semiconductor wafer substrate held on said substrate holding unit; a drive mechanism (conveyor

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22 and XYZ electromechanical positioner 38) for displacing at least one of said semiconductor wafer substrate and said discharging nozzle; and a control unit (items 18, 38, 40, and 42) for controlling said discharging mechanism and said drive mechanism such that said raw sealant resin is attached to said first surface of said semiconductor wafer substrate except at least a portion of said electrode. The camera and vision circuit is an image information device (item 16 and 44) that provides image information of the substrate (such as the location of the drops), and effectively allows for the positioning of the drive mechanism of the nozzle, and therefore provides and is capable of providing the control unit functionality as claim. The apparatus of Bouras, disclosed as dispensing viscous material, is capable of dispensing any sub-species of viscous material including raw sealant resin. Bouras explicitly discloses capturing image information of the substrate prior to discharge (see column 6, lines 18-36).

Bouras and Ciardella '777 do not disclose two different discharging means.

Nakazawa discloses using a discharging mechanism is provided with a plurality of discharging nozzles (see Figures 7A, 7B, 8A, and 8B). The discharging nozzle of Nakazawa meet the limitation of being two different kinds of discharging mechanisms, heads or means. Nakazawa discloses that different nozzle sizes can be used in order minimize the differences in the rate of resin dispensing, so that the formation of resin-less voids is deterred (column 4, lines 26-45). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized multiple nozzles as in Nakazawa in order to avoid resin-less voids.

As to claim 9, the control unit of Bouras is capable of said control unit controls said discharging mechanism and said drive mechanism such that a first discharging mechanism of

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said at least two kinds of discharging mechanisms is capable of discharging droplets of raw sealant resin of an amount smaller than other discharging mechanisms used for discharging said raw sealant resin for an area in a vicinity of said electrode.

Similarly, claim 31 is rejected under the same grounds as claim 9 above.

9. Claims 5, 9, 27, 31 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ciardella (US 5,711,989), and in view of Prentice (US 6,007,631).

As to claim 5 and 27, Ciardella discloses an apparatus (see Figure 5) for manufacturing a semiconductor device, comprising: a substrate holding unit/means (conveyor and fixer - see lift and lock mechanism in column 3, lines 5-13 and column 5, lines 36-40) for holding a semiconductor wafer substrate (i.e., a circuit board with semiconductor elements thereon, see columns 1-10), wherein said semiconductor wafer substrate is capable of being provided with at least one electrode formed on a first surface thereof (chip 10, solder balls 12, etc), a discharging mechanism (syringe 20 and dispensing needle 22) which is explicitly means for discharging droplets (see abstract, which recites "drop generator") of viscous material (for example, column 8, lines 8-10) contained in a viscous material container unit (syringe 84) through at least one discharging nozzle (nozzle 70) onto said first surface of said semiconductor wafer substrate held on said substrate holding unit; a drive mechanism or means (conveyor 22 and XYZ electromechanical positioner 38) for displacing at least one of said semiconductor wafer substrate and said discharging nozzle; and a control unit or means (items 18, 38, 40, and 42) for controlling said discharging mechanism and said drive mechanism such that said raw sealant resin is attached to said first surface of said semiconductor wafer substrate except at least a

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portion of said electrode. The camera and vision circuit is an image information device or means for (item 16 and 44) that captures and provides image information of the substrate (such as the location of the drops), and effectively allows for the positioning of the drive mechanism of the nozzle, and therefore provides and is capable of providing the control unit functionality as claim, such as the position. The camera is capable of capturing the image prior to discharge. The apparatus of Ciardella, disclosed as dispensing viscous material, is capable of dispensing any sub-species of viscous material including raw sealant resin.

Ciardella does not disclose at least two kinds of discharging mechanisms, heads or means, each being capable of discharging respective different amounts of raw sealant resin.

Prentice discloses at least two kinds of discharging mechanisms, heads or means, (see Figure 5) each being capable of discharging respective different amounts of raw sealant resin. Prentice discloses that such multiple mechanisms allow for parallel processing of the substrates (see abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have two discharging mechanisms in order to achieve parallel processing.

As to claim 9 and 31, the control unit of Ciardella is capable of said control unit controls said discharging mechanism and said drive mechanism such that a first discharging mechanism of said at least two kinds of discharging mechanisms is capable of discharging droplets of raw sealant resin of an amount smaller than other discharging mechanisms used for discharging said raw sealant resin for an area in a vicinity of said electrode.

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10. Claims 5, 9, 27, 31 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bouras and Ciardella '777 and further in view of Prentice (US 6,007,631).

It should be noted that the Bouras reference incorporates by reference the US 5,505,777 to Ciardella reference in column 3, lines 62-65 of Bouras.

As to claim 5, 27 and 39, Bouras and Ciardella '777 discloses an apparatus (see Figure 5 of Bouras, Figure 2 of Ciardella '777) for manufacturing a semiconductor device, comprising: a substrate holding unit (conveyor and fixer - see lift and lock mechanism in Ciardella '777, column 3, lines 5-13 and column 5, lines 36-40) for holding a semiconductor wafer substrate (i.e., a circuit board with semiconductor elements thereon, see columns 1-10), wherein said semiconductor wafer substrate is capable of being provided with at least one electrode formed on a first surface thereof (chip 10, solder balls 12, etc), a discharging mechanism (syringe 20 and dispensing needle 22, see also Figure 3 of Ciardella '777) which is explicitly for discharging droplets (see abstract, which recites "drop generator") of viscous material (for example, column 8, lines 8-10) contained in a viscous material container unit (syringe 20 of Bouras, syringe 84 of Ciardella '777) through at least one discharging nozzle (nozzle 70) onto said first surface of said semiconductor wafer substrate held on said substrate holding unit; a drive mechanism (conveyor 22 and XYZ electromechanical positioner 38) for displacing at least one of said semiconductor wafer substrate and said discharging nozzle; and a control unit (items 18, 38, 40, and 42) for controlling said discharging mechanism and said drive mechanism such that said raw sealant resin is attached to said first surface of said semiconductor wafer substrate except at least a portion of said electrode. The camera and vision circuit is an image information device (item 16 and 44) that provides image information of the substrate (such as the location of the drops), and

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effectively allows for the positioning of the drive mechanism of the nozzle, and therefore provides and is capable of providing the control unit functionality as claim. The apparatus of Bouras, disclosed as dispensing viscous material, is capable of dispensing any sub-species of viscous material including raw sealant resin. Bouras explicitly discloses capturing image information of the substrate prior to discharge (see column 6, lines 18-36).

Bouras and Ciardella '777 do not disclose two different discharging means, heads or means, each being capable of discharging respective different amounts of raw sealant resin.

Prentice discloses at least two kinds of discharging mechanisms, heads or means, (see Figure 5) each being capable of discharging respective different amounts of raw sealant resin. Prentice discloses that such multiple mechanisms allow for parallel processing of the substrates (see abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have two discharging mechanisms in order to achieve parallel processing.

As to claim 9 and 31, the control unit of either Ciardella '777 and/or Bouras is capable of said control unit controls said discharging mechanism and said drive mechanism such that a first discharging mechanism of said at least two kinds of discharging mechanisms is capable of discharging droplets of raw sealant resin of an amount smaller than other discharging mechanisms used for discharging said raw sealant resin for an area in a vicinity of said electrode.

11. Claims 5, 9, 27, 31 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ciardella (US 5,711,989), and in view of Cavallaro (US 6,017,392).

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As to claim 5 and 27, Ciardella discloses an apparatus (see Figure 5) for manufacturing a semiconductor device, comprising: a substrate holding unit/means (conveyor and fixer - see lift and lock mechanism in column 3, lines 5-13 and column 5, lines 36-40) for holding a semiconductor wafer substrate (i.e., a circuit board with semiconductor elements thereon, see columns 1-10), wherein said semiconductor wafer substrate is capable of being provided with at least one electrode formed on a first surface thereof (chip 10, solder balls 12, etc), a discharging mechanism (syringe 20 and dispensing needle 22) which is explicitly means for discharging droplets (see abstract, which recites "drop generator") of viscous material (for example, column 8, lines 8-10) contained in a viscous material container unit (syringe 84) through at least one discharging nozzle (nozzle 70) onto said first surface of said semiconductor wafer substrate held on said substrate holding unit; a drive mechanism or means (conveyor 22 and XYZ electromechanical positioner 38) for displacing at least one of said semiconductor wafer substrate and said discharging nozzle; and a control unit or means (items 18, 38, 40, and 42) for controlling said discharging mechanism and said drive mechanism such that said raw sealant resin is attached to said first surface of said semiconductor wafer substrate except at least a portion of said electrode. The camera and vision circuit is an image information device or means for (item 16 and 44) that captures and provides image information of the substrate (such as the location of the drops), and effectively allows for the positioning of the drive mechanism of the nozzle, and therefore provides and is capable of providing the control unit functionality as claim, such as the position. The camera is capable of capturing the image prior to discharge. The apparatus of Ciardella, disclosed as dispensing viscous material, is capable of dispensing any sub-species of viscous material including raw sealant resin.

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Ciardella does not disclose at least two kinds of discharging mechanisms, heads or means, each being capable of discharging respective different amounts of raw sealant resin.

Cavallaro discloses at least two kinds of discharging mechanisms, heads or means, each being capable of discharging respective different amounts of raw sealant resin. Cavallaro discloses that each mechanism can be connected to or include different types of nozzles and/or dispense different types of liquids (column 2). Cavallaro discloses that this system allows for the assembly to dispense at different locations without it being necessary to move the entire pump assembly every time a dot is dispensed. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have two discharging mechanisms in order to dispense at multiple locations without moving the entire assembly.

As to claim 9 and 31, the control unit of Ciardella is capable of said control unit controls said discharging mechanism and said drive mechanism such that a first discharging mechanism of said at least two kinds of discharging mechanisms is capable of discharging droplets of raw sealant resin of an amount smaller than other discharging mechanisms used for discharging said raw sealant resin for an area in a vicinity of said electrode.

12. Claims 5, 9, 27, 31 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bouras and Ciardella '777 and further in view of Cavallaro (US 6,017,392).

It should be noted that the Bouras reference incorporates by reference the US 5,505,777 to Ciardella reference in column 3, lines 62-65 of Bouras.

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As to claim 5, 27 and 39, Bouras and Ciardella '777 discloses an apparatus (see Figure 5 of Bouras, Figure 2 of Ciardella '777) for manufacturing a semiconductor device, comprising: a substrate holding unit (conveyor and fixer - see lift and lock mechanism in Ciardella '777, column 3, lines 5-13 and column 5, lines 36-40) for holding a semiconductor wafer substrate (i.e., a circuit board with semiconductor elements thereon, see columns 1-10), wherein said semiconductor wafer substrate is capable of being provided with at least one electrode formed on a first surface thereof (chip 10, solder balls 12, etc), a discharging mechanism (syringe 20 and dispensing needle 22, see also Figure 3 of Ciardella '777) which is explicitly for discharging droplets (see abstract, which recites "drop generator") of viscous material (for example, column 8, lines 8-10) contained in a viscous material container unit (syringe 20 of Bouras, syringe 84 of Ciardella '777) through at least one discharging nozzle (nozzle 70) onto said first surface of said semiconductor wafer substrate held on said substrate holding unit; a drive mechanism (conveyor 22 and XYZ electromechanical positioner 38) for displacing at least one of said semiconductor wafer substrate and said discharging nozzle; and a control unit (items 18, 38, 40, and 42) for controlling said discharging mechanism and said drive mechanism such that said raw sealant resin is attached to said first surface of said semiconductor wafer substrate except at least a portion of said electrode. The camera and vision circuit is an image information device (item 16 and 44) that provides image information of the substrate (such as the location of the drops), and effectively allows for the positioning of the drive mechanism of the nozzle, and therefore provides and is capable of providing the control unit functionality as claim. The apparatus of Bouras, disclosed as dispensing viscous material, is capable of dispensing any sub-species of

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viscous material including raw sealant resin. Bouras explicitly discloses capturing image information of the substrate prior to discharge (see column 6, lines 18-36).

Bouras and Ciardella '777 do not disclose two different discharging means, heads or means, each being capable of discharging respective different amounts of raw sealant resin.

Cavallaro discloses at least two kinds of discharging mechanisms, heads or means, each being capable of discharging respective different amounts of raw sealant resin. Cavallaro discloses that each mechanism can be connected to or include different types of nozzles and/or dispense different types of liquids (column 2). Cavallaro discloses that this system allows for the assembly to dispense at different locations without it being necessary to move the entire pump assembly every time a dot is dispensed. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have two discharging mechanisms in order to dispense at multiple locations without moving the entire assembly.

As to claim 9 and 31, the control unit of Ciardella '777 and/or Bouras is capable of said control unit controls said discharging mechanism and said drive mechanism such that a first discharging mechanism of said at least two kinds of discharging mechanisms is capable of discharging droplets of raw sealant resin of an amount smaller than other discharging mechanisms used for discharging said raw sealant resin for an area in a vicinity of said electrode.

Response to Arguments

13. Applicant's arguments filed 4/4/2008 have been fully considered but they are not persuasive. See the examiner's answer filed 2/4/2008 and the remarks filed 2/23/2007.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to George R. Koch III whose telephone number is (571) 272-1230 (TDD only). If the applicant cannot make a direct TDD-to-TDD call, the applicant can communicate by calling the Federal Relay Service at 1-866-377-8642 and giving the operator the above TDD number. The examiner can also be reached by E-mail at george.koch@uspto.gov in accordance with MPEP 502.03. The examiner can normally be reached on M-F 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Philip Tucker can be reached on (571) 272-1095. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/George R. Koch III/
Primary Examiner, Art Unit 1791

4/13/2008